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ABSTRACT

Statistical information about employment in 13 engineering trades occupations in Australia was examined to identify skill shortages in the country's engineering trades. Data from various Department of Employment, Workplace Relations and Small Business (DEWRSB) reports regarding the supply of and demand for skills in the engineering trades including a 1999 DEWRSB survey of Australian employers' recent experience of skill shortages in the engineering trades were analyzed. Overall, the combination of commencements in new apprenticeship training, the availability of nonapprenticeship training pathways to the engineering trades, declining employment growth in recent years, and projected low growth in the future has been sufficient to keep pace with employment trends in the trades. However, despite continuing declines in total employment in the engineering trades, skill shortages are likely to persist especially for the more specialized metals trades. The study suggested that the issues of relevance and quality of training for existing workers and new entrants to the engineering trades will be even more critical than increasing the numbers of individuals in training. The biggest challenge to meeting Australia's rapidly changing engineering skill needs appears to be ensuring that the content and coverage of training keeps pace with the rapid rate of technological change in engineering. (Contains 14 tables, 6 figures, and 7 boxes.) (MN)

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Preface

THREE WORKING GROUPS were established in late 1999 to examine trade skill shortages in the electrotechnology, engineering and automotive repair and service trades. This followed discussions on emerging trade skill shortages between the Commonwealth Government and the leaders of Australia's major employer organisations—the Australian Chamber of Commerce and Industry, the Australian Industry Group and the Business Council of Australia.

The National Centre for Vocational Education Research (NCVER) was represented on each of the industry-led working groups. NCVER provided key statistical information and analysis of evidence of skill shortages in each of the trades under review. This analytical work proved important in each working group's deliberations about the specific nature of skill shortages in different trades and about proposals to address any emerging trade skills shortages.

This report on evidence of skill shortages in the engineering trades is based on the analysis provided by the NCVER to the Engineering Working Group. This work also draws upon key information provided to the working group by the Department of Employment, Workplace Relations and Small Business (DEWRSB). This analysis contributed to the findings of the Engineering Working Group's final report *Skills shortages in engineering* presented to the National Industry Skills Forum held in Melbourne in April 2000.

This report makes use of the terms 'apprenticeships', 'traineeships', 'new apprenticeships' and 'contracts of training'. For all intents and purposes the terms are interchangeable. However, by way of clarification, it should be noted that apprentices and trainees enter into a contract of training for the term of their apprenticeship or traineeship. Australia has had apprenticeships since the early 1800s. Traineeships were introduced in 1985 to complement the apprenticeship system. Apprenticeships and traineeships were merged into a single national system—new apprenticeships—on 1 January 1998.

1 Introduction

RECENTLY, EMPLOYERS IN a number of critical economic sectors have been reporting increased difficulties in securing the necessary skills in their industries. Certainly there has been growing concern about skill shortages in a number of sectors in the Australian labour market in the past couple of years with the increased demand for some skills as a result of improvements in the Australian economy. However, such concerns are not particularly new since skill shortages are a recurring and persistent feature of the Australian labour market.

In developing appropriate industry or sector-based responses to skill shortages, it is necessary to first determine:

- To what extent do skill shortages exist in terms of the types of skills in short supply and the areas where they are in short supply?
- What are the underlying causes of the shortages that exist?

With respect to underlying causes, skill shortages in the trades can arise from:

- an inadequate number of people entering trade training
- a high attrition rate during the training period which means that not enough people are completing trade training and attaining the qualifications necessary for highly skilled/technical work in the trades
- a high separation from the skilled trades workforce once people are qualified due to a variety of reasons, such as low demand for skills, declining industry employment prospects or better careers and conditions being offered in other industries/sectors
- an insufficient level of activity by the existing trade workforce in upgrading skills once initial qualifications have been attained
- a failure by training providers to ensure that the quality and relevance of training provision keeps pace with rapidly changing skills needs in the workforce
- a combination of the above

In this report, evidence about patterns and trends in trades employment and training in the engineering trades is reviewed in order to gauge the nature and extent of any skills shortages. The report has been prepared using statistical information supplied by the NCVER, the Australian Bureau of Statistics (ABS) and key information provided by the Department of Employment, Workplace Relations and Small Business.

The trades examined in this report cover the principal mechanical and fabrication engineering trades including:

- general mechanical engineering
- metal fitters and machinists
- toolmakers
- aircraft maintenance engineers
- precision metal tradespersons
- general fabrication engineering tradespersons
- structural steel and welding tradespersons
- forging tradespersons
- metal casting tradespersons
- metal finishing tradespersons
- mechanical engineering associate professionals
- other building and engineering associate professionals

2 Demand for skills in the engineering trades

2.1 Employment levels

TOTAL EMPLOYMENT IN the engineering trades workforce is 217 000 people. This amounts to some 2.5 per cent of all employment in Australia. Engineering trades are the second largest area of employment in Australia's trades workforce (after construction), accounting for some 17 per cent of total trades employment in Australia.

As shown in table 1, the two largest engineering trades occupations are metal fitters and machinists employing some 95 000, and structural steel and welding tradespersons employing some 64 000. Other significant engineering trades occupations are precision metal trades (10 500), sheetmetal workers (8300) and toolmakers (7200).

2.2 Employment growth

There has been a significant relative decline in employment in the engineering trades over the past decade. The Department of Employment, Workplace Relations and Small Business (DEWRSB) reported that engineering trades employment declined 37 300 or 15.8 per cent over the past decade. Over the five years to August 1999 metal trades employment fell by 3500 or 3.2 per cent with falls for most trades except for structural steel welding, precision metal, aircraft maintenance engineers and general mechanical engineering.

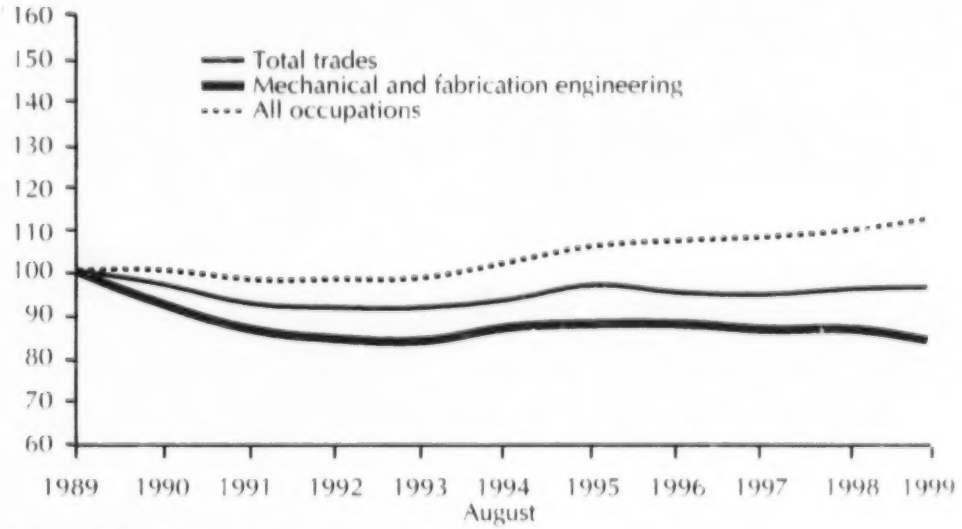
As shown on figure 1, this decline contrasts with the picture of employment growth in the trades generally over the last decade.

Table 1: Employment in engineering trades occupations

Employment in August 1999	Number ('000)	Share (%)
Mechanical and fabrication engineering trade occupation		
4111 General mechanical engineering tradespersons	1.0*	0.5
4112 Metal fitters and machinists	94.5	43.4
4113 Toolmakers	7.2	3.3
4114 Aircraft maintenance engineers	9.7	4.5
4115 Precision metal tradespersons	10.5	4.8
All 411 sub-total	*122.9*	*56.5*
4121 General fabrication engineering tradespersons	0.3*	0.1
4122 Structural steel and welding tradespersons	63.8	29.3
4123 Forging tradespersons	1.6*	0.7
4124 Sheetmetal tradespersons	8.3	3.8
4125 Metal casting tradespersons	1.7*	0.8
4126 Metal finishing tradespersons	1.2*	0.6
All 412 sub-total	*76.9*	*35.3*
3125 Mechanical engineering associate professionals	10.6	4.9
3129 Other building and engineering associate professionals	7.2	3.3
Total	**217.6**	**100.0**

Notes: * Subject to relative standard error of greater than 25%
3125 Mechanical engineering and associate professionals is combined figure for:
3125-11 Mechanical engineering associates
3125-13 Mechanical engineering technician
3129 other building and engineering associate professionals is combined figure for:
3129-11 Biomedical engineering associate
3129-13 Metallurgical and materials technician
3129-15 Mine deputy
3129-79 Building and engineering associate professionals
Source: ABS labour force survey estimates, unpublished data

Figure 1: Engineering total trades and total employment, 1989–99 (indexed)



Source: ABS labour force survey

2.3 Employment prospects

An underlying precondition for the existence of skill shortages is usually (but not always) a rising demand for skilled labour in a growing labour market. While it is possible for skill shortages to exist in a declining labour market, this situation is much less frequent.

Employment forecasts (made using the Econtech Model), predict low employment growth in the engineering trades of around 0.4 per cent per year in the coming years (Murphy 1998). This is shown in table 2.

However, the projected growth is different across the different skilled trades within the engineering trades. For instance, while mechanical engineering associate professionals (and technicians) are predicted to increase by 0.9 per cent, other occupations such as aircraft maintenance engineers and precision metal tradespersons are predicted to decline.

Longer-term forecasts by DEWRSB (using the Monash Model) suggest that engineering employment to the year 2004–05 is, on average, projected to grow at a slower rate than employment generally. Nevertheless, unless the underlying causes of the trades shortages are dealt with, shortages of specific metals trades are expected to persist, with shortages becoming more widespread if relatively strong economic growth is sustained over the medium term.

2.4 Overview of the demand for engineering skills

The patterns of employment change in the engineering trades suggest further declining employment in these trades. However, this picture of overall decline is also likely to be accompanied by persistent shortages in specific metals trades.

DEWRSB reports that the demand for metal trades is closely linked to trends in metal manufacturing, non-residential construction and to a lesser extent, mining. Activity in metal manufacturing has been weak due to competition from imports and subdued investment. Demand for metal trades from mining has also been adversely affected by the downturn in the resources sector. However, strong growth in non-residential construction, especially in New South Wales, has resulted in strong demand for some metal trades. Overall demand for metal tradespersons has, however, eased considerably in the last two years due to the negative impact of the Asian economic crisis on some resource projects, especially in Western Australia and the Northern Territory.

The overall situation concerning the demand for trades skills in the engineering trades is summarised in box 1.

Table 2: Engineering trades occupations employment forecasts

	Average annual growth 1997–98 to 2000–01 (% pa)	Total employment 1997–98 to 2000–01 (000's)	(000's)	Share of total employment 1997–98 to 2000–01 (%)	(%)
Engineering trade occupation					
4111 General mechanical engineering tradespersons	0.3	1.2	1.2	0.0	0.0
4112 Metal fitters and machinists	0.3	96.7	97.5	1.1	1.1
4113 Toolmakers	0.2	10.1	10.2	0.1	0.1
4114 Aircraft maintenance engineers	-0.6	14.5	14.2	0.2	0.2
4115 Precision metal tradespersons	-0.2	9.4	9.3	0.1	0.1
All 411 sub-total	*0.1*	*131.9*	*132.4*	*1.5*	*1.5*
4121 General fabrication engineering tradespersons	0.5	0.8	0.8	0.0	0.0
4122 Structural steel and welding tradespersons	0.8	59.1	60.5	0.7	0.7
4123 Forging tradespersons	-1.0	1.5	1.5	0.0	0.0
4124 Sheetmetal tradespersons	0.8	10.6	10.8	0.1	0.1
4125 Metal casing tradespersons	0.4	1.5	1.5	0.0	0.0
4126 Metal finishing tradespersons	0.4	2.2	2.2	0.0	0.0
All 412 sub-total	*0.7*	*75.7*	*77.3*	*0.8*	*0.8*
3125 Mechanical engineering associate professionals	0.9	7.2	7.4	0.1	0.1
3129 Other building and engineering associate professionals	0.8	10.2	10.4	0.1	0.1
Total	**0.4**	**225.0**	**227.5**	**2.5**	**2.5**

Notes: 3125 Mechanical engineering and associate professionals is combined figure for:
3125-11 Mechanical engineering associates
3125-13 Mechanical engineering technician
3129 Other building and engineering associate professionals is combined figure for:
3129-11 Biomedical engineering associate
3129-11 Biomedical engineering associate
3129-15 Mine deputy
3129-79 Building and engineering associate professionals

Source: ECONTECH model projections supplied to NCVER

Box 1: Demands for skills in the engineering trades

- Engineering trades represent the second largest trade group in the workforce, with 217 000 people in the skilled trades workforce.
- Employment in the engineering skilled trades workforce has declined significantly over the past decade.
- Total employment in the engineering trades is projected to grow more slowly than employment generally over the next few years.
- Despite this slow rate of growth, continuing shortages are expected to be evident in specific metals trades.

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3 Supply of skills to the engineering trades

SKILLS TO THE engineering trades are supplied from four major sources:

- the skills of existing trades workforce, including the upgrading of skills of the existing workforce
- new apprentices entering the engineering trades
- skills training undertaken through other (non-apprentice) training pathways
- skilled migration into the engineering trades

Of course the other critical issue in relation to the supply of skills to the engineering trades concerns the rate of skills wastage arising from skilled and qualified labour leaving these skilled trades occupations. Each of these factors is examined below.

3.1 Skills of the existing engineering trades workforce

Nearly 70 per cent of the skilled trades workforce in the engineering trades has post-school qualifications, as shown in table 3. This is a much higher proportion than the average for the whole Australian workforce, this proportion being below 50 per cent. The information in table 3 shows the highest qualification attained. Some of those with degrees, diplomas and associated diplomas may also have vocational qualifications.

For the engineering trades as a whole:

- Only 4 per cent of employed persons has a diploma or associate diploma as their highest qualification, which is considerably lower than the 8 per cent for the workforce as a whole.
- Almost 63 per cent possesses a vocational qualification, compared with a workforce average of less than 20 per cent of employed persons having a vocational qualification as their highest level attained.

Table 3: The education attainment of persons employed in the engineering trades, and the total workforce, 1996

Categories	Degree or higher	Diploma	Associate diploma	Skilled vocational qualification	Basic vocational qualification	Sub-total with qualifications	No qualification	Not stated/ unknown	Total
4111 General mechanical engineering tradespersons	18	13	43	724	10	808	206	49	**1 063**
4112 Metal fitters and machinists	1 188	563	1 931	58 021	829	62 532	16 135	4 234	**82 901**
4113 Toolmakers	109	109	294	5 728	114	6 354	1 768	674	**8 796**
4114 Aircraft maintenance engineers	203	206	615	7 532	162	8 718	1 577	635	**10 930**
4115 Precision metal tradespersons	254	123	343	3 954	199	4 873	2 646	558	**8 077**
All 411 sub-total	*1 772*	*1 014*	*3 226*	*75 959*	*1 314*	*83 285*	*22 332*	*6 150*	***111 767***
4121 General fabrication engineering tradespersons	35	22	17	358	8	440	208	36	**684**
4122 Structural steel and welding tradespersons	257	160	328	30 312	822	31 879	16 009	3 371	**51 259**
4123 Forging tradespersons	24	10	15	628	20	697	539	101	**1 337**
4124 Sheetmetal tradespersons	54	38	44	5 117	77	5 330	3 329	522	**9 181**
4125 Metal casing tradespersons	25	14	9	719	6	773	451	86	**1 310**
4126 Metal finishing tradespersons	25	16	27	435	31	534	1 181	143	**1 858**
All 412 sub-total	*420*	*260*	*440*	*37 569*	*964*	*39 653*	*21 717*	*4 259*	***65 629***
3125 Mechanical engineering associate professionals	294	229	1 346	1 732	196	3 797	899	244	**4 940**
3129 Other building and engineering associate professionals	422	208	781	2 314	590	4 315	2 229	598	**7 142**
Total Australian workforce	**1 181 592**	**342 420**	**278 458**	**1 087 955**	**278 007**	**3 168 432**	**3 914 122**	**553 822**	**7 636 376**

Sources: NCVER 1998, table A2; ABS 1996 Census of Population and Housing

- Only 1.5 per cent possesses a degree-level or higher qualification compared with over 15 per cent having such qualifications in the workforce as a whole.

In relative terms, this means that the proportion of the workforce in engineering trades who possesses a vocational qualification is very high by comparison with the levels of qualifications held by the workforce as a whole. However, the proportion with higher-level qualifications is very low compared with the Australian workforce.

Significantly, the numbers who have no formal post-school qualifications, but are working in the mechanical engineering and fabrication trades, are less than 25 per cent of the total workforce. This is a comparatively low level, given that around half of the Australian workforce reported having no post-school qualification in 1996.

A summary of the situation concerning the existing skills of the existing workforce is given in box 2 below.

Box 2: Skills of the existing engineering trades workforce

- Almost 70 per cent of the existing engineering trades workforce hold a post-school qualification, compared with only 50 per cent of the workforce as a whole having qualifications.
- The incidence of vocational qualifications in the engineering trades workforce is very high (63 per cent), compared with fewer than 20 per cent of the national workforce having a vocational qualification.
- But one-quarter of the engineering trades workforce has no formal qualifications. This situation may not meet contemporary industry needs for higher-level technical skills.

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3.2 New apprenticeship patterns and trends

The Commonwealth Government and State and Territory governments have reformed the apprenticeship and trainee system by making it more flexible and responsive to employer needs with the aim of ensuring that the highest quality training is provided. The new training arrangements, covering apprenticeships and traineeships, are collectively known as new apprenticeships. They were introduced from 1 January 1998.

Although new apprenticeships cover both apprentice and traineeship training, the vast majority of entry-level skills training in the engineering trades through contracts of training with employers occurs through the apprenticeship pathway, leading to a certificate III qualification (typically involving a four-year apprenticeship contract).

The apprenticeship pathway accounts for almost all of those in contracts of training as general mechanical engineering tradespersons, metal fitters and machinists, general fabrication engineering and welding tradespersons. Moreover almost all of those in the other engineering tradespersons category are also apprentices.

At the end of 1999, of the 18 760 contracts of training shown in table 4, apprenticed trades (at the certificate III level) account for nearly 90 per cent of all those in a contract of training in engineering occupations.

The contracts of training where non-traditional apprenticeships (that is, traineeships) are more prevalent are in the occupations of mechanical engineering associate professionals and mechanical engineering technicians. Although only a small total number, 40 per cent of new apprentices in the mechanical associate professional occupation were at AQF levels I or II in 1998 and nearly 50 per cent of mechanical engineering technician new apprentices.

Almost all of the engineering trades are at AQF level III or higher. This has been a stable position from 1995 to 1998. However, commencements in the mechanical engineering associate professional occupations have moved from 100 per cent certificate III and higher in 1995 to 100 per cent certificate I or II in 1998. In the case of mechanical engineering technicians 62 per cent of commencements were at certificate I or II in 1998.

As can be seen from table 4, overall the proportion of the total skilled trades workforce in the engineering trades is just under 10 per cent (that is, 8.6 per cent as shown in table 4). This average is lower than for all skilled trades in Australia, where almost 12 per cent of the skilled trades workforce, on average, is supplied by those in new apprenticeships.

The key issues to consider in relation to the contribution of apprentices and trainees to the supply of skills are whether or not:

- the numbers entering contracts of training are sufficient to meet industry needs
- the numbers staying in apprenticeships and traineeships to complete their training are adequate

Apprenticeship training in the engineering trades (and all other major trades) experienced a decline in Australia in the early 1990s from the record high levels of the late 1980s.

Table 4: Engineering new apprenticeships, 31 December 1999

Category		No. of new apprentices[1,2]	Proportion of total new apprentices	New apprentices as a proportion of total skilled trades workforce
			(%)	(%)
4111	General mechanical engineering tradespersons	1 937	10.3	193.7
4112	Metal fitters and machinists	1 951	10.4	2.1
4113	Toolmakers	64	0.3	0.9
4114	Aircraft maintenance engineers	632	3.4	6.5
4115	Precision metal tradespersons	277	1.5	2.6
Other 411	(not known at 4-digit level)	4 807	25.6	
All 411 sub-total		*9 668*	*51.5*	*7.7*
4121	General fabrication engineering tradespersons	2 205	11.8	735.0
4122	Structural steel and welding tradespersons	675	3.6	1.1
4123	Forging tradespersons	80	0.4	5.0
4124	Sheetmetal tradespersons	163	0.9	2.0
4125	Metal casting tradespersons	59	0.3	3.4
4126	Metal finishing tradespersons	8	0.04	0.7
Other 412	(not known at 4 digit level)	4 424	23.6	
All 412 sub-total		*7 614*	*40.6*	*9.9*
3125-11	Mechanical engineering associates	67	0.4	0.6
3125-13	Mechanical engineering technicians	1 411	7.5	
All 'other' sub-total		*1 478*	*7.9*	*8.3*
Total		**18 760**	**100.0**	**8.6**

Source: NCVER unpublished apprentice and trainee data

The number of commencements in engineering apprentices and trainees declined by an average of 2.0 per cent for mechanical trades and 5.7 per cent for fabrication trades between 1995 and 1999. As shown in table 5, this pattern varies between the different skilled trades in these industries, with most of the growth in both trades accounted for by significant increases in general engineering tradespersons.

The key point is that the decline in commencements since the mid-1990s mirrors the net decline in employment in the engineering trades, which has averaged 3.2 per cent in the last five years. However, recent rises in the number of commencements are concentrated in certain occupational groups—general

engineering—while the other trade groups are still experiencing steep declines in the commencements of new apprentices.

There have also been significant declines in the overall numbers in an apprenticeship or traineeship in the engineering trades since the mid-1990s. As shown in table 6, since 1995, the decline in the numbers in training has consistently averaged each year at around 4.1 per cent in mechanical engineering and 2.5 per cent in fabrication. Again this decline has varied in different sectors within the engineering trades, with general engineering recording significant rises over the period while the more specialised metal trades have fallen sharply. Mechanical engineering technicians also recorded very high rises in numbers in training over the period 1995–98.

Despite the growth of the general engineering and mechanical engineering technicians, continuing declines in the numbers in training in the specialised occupations mean that the proportion of new apprentices in the skilled workforce is unlikely to increase significantly from its present low level in the near future.

If we consider apprentice and trainee completions (table 7), we can see that over 5760 people completed their new apprenticeship in 1999. Taking a crude completion rate, this amounts to a completion rate of 78 per cent of all commencements in 1995 (noting the most prevalent contracts of training in these trades are typically of 3 years duration). This is a very healthy rate of completion.

Moreover, growth of 5 per cent per year in completions has been attained since the mid-1990s. However, between 1998 and 1999 completions have declined by 0.4 per cent. This reflects the decline in commencements since the mid-1990s and is likely to continue for the next couple of years until the impact of recent rises in commencement feeds through the system. It is important, however, to point out that the NCVER has found that there are problems with completions data. The reported new apprentice completions are below the true level of completions being recorded in national data, because not all completions are being reported.

While in overall terms, the number of around 5800 completions per year should be enough to meet the skill needs of occupations that are only growing slowly, the differentiated pattern of completions and commencements across trade groups means that some occupations are likely to experience shortfalls in the number of skilled people entering the trade.

A significant issue in relation to the supply of skills to the trades through new apprenticeships concerns the age of apprentices and trainees.

The NCVER reports that, while there has been a marginal decline in the proportion of commencing apprentices (and trainees) aged 15–19 years, the number of commencing apprentices (and trainees) has grown across all age groups since 1995. This is shown in table 8.

Table 5: Engineering trades occupation commencements, 1995–99

		Number					Annual growth rate 1995–99 (%)	Annual growth rate 1995–98 (%)	Growth rate 1998–99 (%)
		1995	1996	1997	1998	1999			
Mechanical engineering									
4111	General mechanical engineering tradespersons	157	125	201	714	1 243	67.7	65.7	74.1
4112	Metal fitters and machinists	1 984	1 347	921	361	263	-39.7	-43.3	-27.1
4113	Toolmakers	49	52	37	6	2	-55.1	-50.3	-66.7
4114	Aircraft maintenance engineers	318	271	228	140	132	-19.7	-23.9	-5.7
4115	Precision metal tradespersons	215	132	105	78	56	-28.6	-28.7	-28.2
Other 411	Mechanical engineering tradespersons not known at 4-digit level	965	1 188	1 206	1 989	1 706	15.3	27.3	-14.2
All 411 sub-total		*3 688*	*3 115*	*2 698*	*3 288*	*3 402*	*-2.0*	*-3.8*	*3.5*
Fabrication									
4121	General fabrication engineering tradespersons	607	658	602	780	907	10.6	8.7	16.3
4122	Structural steel and welding tradespersons	803	514	266	211	79	-44.0	-35.9	-62.6
4123	Forging tradespersons	31	36	26	28	29	-1.7	-3.3	3.6
4124	Sheetmetal tradespersons	317	159	64	40	29	-45.0	-49.8	-27.5
4125	Metal casting tradespersons	71	28	27	12	13	-34.6	-44.7	8.3
4126	Metal finishing tradespersons	13	13	1	1	0	-100.0	-57.5	-100.0
Other 412	Fabrication engineering tradespersons not known at 4-digit level	1 269	1 155	1 076	1 871	1 400	2.5	13.8	-25.2
All 412 sub-total		*3 111*	*2 563*	*2 062*	*2 943*	*2 457*	*-5.7*	*-1.8*	*-16.5*
Other									
3125-11	Mechanical engineering associates	29	19	20	20	31	1.7	-11.6	55.0
3125-13	Mechanical engineering technicians	471	1 270	2 215	1 999	1 472	33.0	61.9	-26.4
3129-13	Metallurgical and materials technicians	0	0	0	0	0	0.0	0.0	0.0
All 'Other' sub-total		*500*	*1 289*	*2 235*	*2 019*	*1 503*	*31.7*	*59.2*	*-25.6*
Total		**7 299**	**6 967**	**6 995**	**8 250**	**7 362**	**0.2**	**4.2**	**-10.8**

Notes: * Annual rates of growth are compound growth rates.
(a) Represents figures between 1 and 9 inclusive.

Source: NCVER unpublished apprentice and trainee data, March 2001.

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Table 6: Engineering trades number in training, 1995–99

		Number					Annual growth rate 1995–99	Annual growth rate 1995–98	Growth rate 1998–99
		1995	1996	1997	1998	1999	(%)	(%)	(%)
Mechanical engineering									
4111	General mechanical engineering tradespersons	362	405	485	1 126	1 937	52.1	46.0	72.0
4112	Metal fitters and machinists	6 784	6 072	4 992	3 299	1 951	-26.8	-21.4	-40.9
4113	Toolmakers	194	191	174	105	64	-24.2	-18.5	-39.0
4114	Aircraft maintenance engineers	1 018	1 015	940	823	632	-11.2	-6.8	-23.2
4115	Precision metal tradespersons	693	605	496	383	277	-20.5	-17.9	-27.7
Other 411	Mechanical engineering tradespersons not known at 4-digit level	2 375	2 920	3 383	4 370	4 807	19.3	22.5	10.0
All 411 sub-total		*11 426*	*11 208*	*10 470*	*10 106*	*9 668*	*-4.1*	*-4.0*	*-4.3*
Fabrication									
4121	General fabrication engineering tradespersons	1 592	1 835	1 915	2 019	2 205	8.5	8.2	9.2
4122	Structural steel and welding tradespersons	2 470	2 265	1 779	1 236	675	-27.7	-20.6	-45.4
4123	Forging tradespersons	96	98	84	89	80	-4.5	-2.5	-10.1
4124	Sheetmetal tradespersons	920	821	598	344	163	-35.1	-28.0	-52.6
4125	Metal casting tradespersons	212	180	153	95	59	-27.4	-23.5	-37.9
4126	Metal finishing tradespersons	60	46	31	17	8	-39.6	-34.3	-52.9
Other 412	Fabrication engineering tradespersons not known at 4-digit level	3 061	3 517	3 765	4 453	4 424	9.6	13.3	-0.7
All 412 sub-total		*8 411*	*8 762*	*8 325*	*8 253*	*7 614*	*-2.5*	*-0.6*	*-7.7*
Other									
3125-11	Mechanical engineering associates	66	67	72	71	67	0.4	2.5	-5.6
3125-13	Mechanical engineering technicians	405	1 055	1 969	1 710	1 411	36.6	61.6	-17.5
3129-13	Metallurgical and materials technicians	0	0	0	0	0	0.0	0.0	0.0
All 'Other' sub-total		*471*	*1 122*	*2 041*	*1 781*	*1 478*	*33.1*	*55.8*	*-17.0*
Total		**20 308**	**21 092**	**20 836**	**20 140**	**18 760**	**-2.0**	**-0.3**	**-6.9**

Table 7: Engineering trades completions, 1995–99

		Number					Annual growth rate 1995–99	Annual growth rate 1995–98	Growth rate 1998–99
		1995	1996	1997	1998	1999	(%)	(%)	(%)
Mechanical engineering									
4111	General mechanical engineering tradespersons	34	29	81	115	233	61.8	50.1	102.6
4112	Metal fitters and machinists	1 987	1 742	1 671	1 667	1 333	-9.5	-5.7	-20.0
4113	Toolmakers	27	44	42	58	38	8.9	29.0	-34.5
4114	Aircraft maintenance engineers	557	218	229	231	259	-17.4	-25.4	12.1
4115	Precision metal tradespersons	197	154	159	126	115	-12.6	-13.8	-8.7
Other 411	Mechanical engineering tradespersons not known at 4-digit level	314	366	518	643	786	25.8	27.0	22.2
All 411 sub-total		*3 116*	*2 553*	*2 700*	*2 840*	*2 764*	*-3.0*	*-3.0*	*-2.7*
Fabrication									
4121	General fabrication engineering tradespersons	164	267	336	458	478	30.7	40.8	4.4
4122	Structural steel and welding tradespersons	618	529	570	621	516	-4.4	0.2	-16.9
4123	Forging tradespersons	17	18	19	14	23	7.8	-6.3	64.3
4124	Sheetmetal tradespersons	226	179	199	202	164	-7.7	-3.7	-18.8
4125	Metal casting tradespersons	44	38	41	57	40	-2.4	9.0	-29.8
4126	Metal finishing tradespersons	18	21	10	6	5	-27.4	-30.7	-16.7
Other 412	Fabrication engineering tradespersons not known at 4-digit level	440	446	592	747	906	19.8	19.3	21.3
All 412 sub-total		*1 527*	*1 498*	*1 767*	*2 105*	*2 132*	*8.7*	*11.3*	*1.3*
Other									
3125-11	Mechanical engineering associates	25	12	13	17	25	0.0	-12.1	47.1
3125-13	Mechanical engineering technicians	10	159	533	819	839	202.6	334.3	2.4
3129-13	Metallurgical and materials technicians	0	0	0	0	0	0.0	0.0	0.0
All 'Other' sub-total		*35*	*171*	*546*	*836*	*864*	*122.9*	*188.0*	*3.3*
Total		4 678	4 222	5 013	5 781	5 760	5.3	7.3	-0.4

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Table 8: The age of new apprentices in the engineering trades

Age of apprentices and trainees	Proportion of total apprentices and trainees		Average annual growth rates	
	1995 (%)	1999 (%)	1995–99 (%)	1998–99 (%)
No. of commencements				
15–19-year-olds	70.7	67.5	-1.0	-3.9
20–24-year-olds	18.7	19.8	1.7	-12.3
25 years or more	10.6	12.7	4.9	-33.9
All ages	100.0	100.0	0.2	-10.8
Total no. in training				
15–19-year-olds	35.6	36.2	-1.5	0.0
20–24-year-olds	53.7	51.3	-3.2	-8.7
25 years or more	10.7	12.5	2.2	-16.4
All ages	100.0	100.0	-2.0	-6.9

Source: NCVER unpublished apprentice and trainee data

Although there has been some change in the proportions of different age groups in training since 1995, the shift has not been dramatic.

- The proportion of teenagers in engineering trades contracts of training has increased from 35.5 per cent in 1995 to 36.2 per cent in 1999.
- The proportion of 20–24-year-olds in training fell from 53.9 per cent to 51.3 per cent, and the proportion aged 25 years or more rose from 10.6 per cent to 12.5 per cent during this period.

There is an increasing number of post-25-year-olds now entering the engineering trades but the number of teenagers entering and undertaking new apprenticeships is also growing, despite the rapid aging of the Australian population.

This is a critical point. The NCVER reports that demographic projections show that the number of persons in Australia aged 15–24 years will not grow in absolute terms over the next 20 years. In fact the relative proportion of young people in the population will fall considerably. This means the source of new skills for the engineering trades, as for all other occupations, increasingly will have to come from apprentices and trainees who are older when commencing a contract of training.

The other issue of relevance here is the very low level of new apprenticeships in schools in relation to the engineering trades. The NCVER reports (NCVER 2000) that, for the engineering trade occupations, the number of apprentices and trainees who commenced their apprenticeship or traineeship while still attending school comprised an insignificant proportion for each year 1995 to 1998.

Clearly this is an area for consideration in any strategy to boost the intakes of younger people to new apprenticeships in the engineering trades.

A summary of the situation concerning the contribution of apprentices and trainees to the engineering trades is given in box 3.

Box 3: Supply of engineering apprentices and trainees

- The number of apprentices and trainees (now called new apprenticeships) in a contract of training with an employer in the engineering trades is now over 18 000, having remained at around 20 000 between 1995 and 1998.
- Commencements in engineering trades new apprenticeships grew by 4 per cent between 1995 and 1998 but have fallen by 10 per cent since then. However, commencements fell in the mid-1990s and most of the specialised occupations in the metals trades are still experiencing a decline in commencements. Growth is concentrated in the general engineering trades and mechanical engineering technician occupations. This means the specialised trades may continue to suffer from insufficient numbers entering the trades in the context of slow growth.
- Apprentice and trainee completions in the engineering trades grew between 1995 and 1999 (by over 5 per cent per year), but completions growth has declined since 1998, demonstrating that measures to encourage completion of new apprenticeships must be a critical element of any strategy to boost skills in the engineering trades. Although the absolute numbers of 5800 completions per year may be enough to meet the needs of a sector growing at only 0.4 per cent, specific trades within the sector may experience ongoing shortages.
- Moreover, new apprentice completions are not sufficient to make inroads into increasing the numbers in these trades with appropriate qualifications even though there is a case for growth of the proportions of those with appropriate qualifications to rise, noting that the ratio of new apprentices to the total skilled trades workforce is a relatively low 8.6 per cent (compared with other trades).
- However, some of the additional training provision required will come from sources other than new apprenticeships.

3.3 Training undertaken through non-apprentice pathways

This section looks at the general vocational and education and training (VET) student population in 1998 for engineering occupations but excluding those in streams where apprentices and trainees were most likely to be enrolled (that is, streams 3211, 3212, 3221).

It should be noted that, for the apprentice and trainee data presented elsewhere in this report, the ASCO code is based in apprentices' and trainees' declared vocation, that is, the actual job they are employed in. The data

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presented in this section are based on occupation codes assigned to courses to indicate the most likely occupation that the course is relevant to. However, students undertaking a VET course may not necessarily gain employment in the occupation assigned to the course.

The data in this section therefore provide a rough estimate of the amount of non-apprentice and non-trainee VET activity relevant to engineering trade occupations—regardless of whether or not this training is actually utilised in these occupations.

Table 9 shows that around 32 626 students were enrolled in a non-apprentice or non-trainee VET course in 1998 relating to the engineering trade occupations. Just under three-quarters of these, 73.5 per cent, were at AQF level III or equivalent or higher levels. However, the level of qualification varies between the mechanical and fabrication trades with just under 50 per cent of students on mechanical engineering enrolled on other certificates, statements of attainment or non-award courses. In the fabrication trades, by contrast, over 85 per cent of students were enrolled in higher level, certificate III, IV or diploma courses in 1998.

This means that non-apprenticeship training pathways have now become a very substantial source of skills for the engineering trades.

The NCVER figures show that, by the end of 1998 (that is, on 31 December 1998), there were just over 20 000 in new apprenticeships in the engineering trades, compared with nearly 33 000 enrolments during 1998 in VET courses not involving a new apprenticeship but oriented towards skills for the engineering occupations.

A wide variety of different types of training is occurring in these programs. For instance of these non-apprentice students:

- 58 per cent were in advanced/high-level courses leading to diplomas, advanced diplomas or certificate IV level qualifications
- 15 per cent were in certificate III programs, which are traditionally done through apprenticeships
- 4.7 per cent were in certificate I and II level programs
- 22 per cent were undertaking skills training not leading to award or full qualifications

Clearly this non-apprentice training activity represents a wide range of training pathways, from advanced technical courses leading to high-level qualifications through to persons already employed in the industry upgrading their skills through enrolment in one or more modules.

The importance of non-apprenticeship pathways as a source of skills for engineering trades is summarised in box 4.

Table 9: Training in the engineering trades: Non-apprentice and non-trainee VET students, 1998

		Diplomas	AQF Certificate IV and equivalent	AQF Certificate III and equivalent	AQF Certificates I and II	Other certificates, endorsements and other	Statements of attainment	Non award courses	Total students
411	Mechanical engineering tradespersons	710	3 086	693	99	2 085	2 187	70	**8 833**
412	**Fabrication engineering** tradespersons	7	2 642	3 931	210	84	268	522	**7 657**
Net sub-total		*717*	*5 728*	*4 624*	*309*	*2 169*	*2 455*	*592*	***16 490***
3125-11	Mechanical engineering associates	8 557	26	18	23	7	247	0	**8 878**
3125-13	Mechanical engineering technicians	1 319	2 507	260	1 213	0	1 743	0	**7 042**
3129-13	Metallurgical and materials technicians	81	83	52	0	13	16	0	**245**
Net sub-total		*9 957*	*2 616*	*330*	*1 236*	*20*	*2 006*	*0*	***16 165***
Total		**10 674**	**8 344**	**4 947**	**1 545**	**2 186**	**4 461**	**592**	**32 626**

Source: NCVER unpublished data

Box 4: Non-apprentice pathways for skills in engineering trades

- ❖ Alternative vocational pathways are now just as important a source of skills for engineering trades in Australia as the traditional apprenticeship pathway.
- ❖ Throughout 1998 there were nearly 33 000 enrolments in vocational education and training programs that were not new apprenticeships compared to just over 20 000 new apprentices in training by the end of 1998.
- ❖ Almost three-quarters of these non-apprenticeships enrolments (73.5 per cent) were in courses at the certificate III level or higher. Only 5 per cent were at certificate levels I and II.
- ❖ Non-apprenticeship pathways need to be given as much priority as new apprenticeship pathways in any overall skill formation policies for the engineering trades, particularly given that new sources of relevant skills increasingly will need to come from older people in the future.

3.4 Migration as a source of engineering skills

Migration of skilled labour is a source of skills that supplements the domestic skill base in the engineering trades.

DEWRSB reports that in recent years net migration of engineering tradespersons has fluctuated around 600–700, with arrivals of around 1900 partly offset by departures of about 1200. This is shown in table 10.

Table 10: Migration of engineering tradespersons

Year	Permanent and long-term arrivals	Permanent and long-term departures	Net permanent and long-term			
			Settler	Long-term residents	Long-term visitors	Permanent & long-term total
1996–97	160	1202	606	129	-77	658
1997–98	1904	1272	626	64	-58	632
1998–99	1941	1205	820	-83	-1	736

Source: DEWRSB November 1999

Thus, migration is an insignificant source of skills for the engineering trades in Australia, a situation not likely to change. Even if governments were to open up immigration intakes, it is highly unlikely that such a policy would increase net intakes in a significant way because of the global demand for skills in the engineering fields.

The potential for increased migration as a source of new skills in the engineering trades in Australia is summarised in box 5.

Box 5: Migration as a source of new engineering skills

- Net migration is an insignificant source of skills for the engineering trades in Australia with about 700 per year (compared to a skilled trades workforce in this area of 217 000).
- Growing global demand for engineering skills means that migration is likely to remain an insignificant source of such skills for Australia in the future.

3.5 Skills wastage from the engineering trades

The issue of the extent to which qualified and skilled tradespersons leave their employment in their skilled trade is a critical one. This is because the formation of new skills in the trade must be sufficient.

- not only to meet skills needed to fuel growth in the industries
- but also to replace those skills leaving through occupational wastage

DEWRSB report that the proportion of mechanical engineering tradespersons who leave these occupations appears to be below the average for all occupations in contrast to above-average wastage for the fabrication trades. Nevertheless a considerable proportion of qualified engineering tradespersons leave trade employment for non-trade employment. Analysis of 1996 census data shows for those with engineering trade qualifications:

- 39 per cent were working in an engineering trades occupation
- 33 per cent were working in a non-trade occupation
- 5 per cent were unemployed
- 21 per cent were not in the labour force (includes those who retire)

The proportion (39 per cent) of qualified engineering tradespersons who were working in their trade is slightly higher than the average (38 per cent) for all of the trades in the Australian workforce (see figure 2).

In many instances wastage from skilled trades can be largely due to an aging of the skilled trades workforce and high wastage rates because of the retirement of skilled trades workers. However, the wastage occurring from the engineering trades is not due to a higher-than-average incidence of skilled tradespersons in the older age groups.

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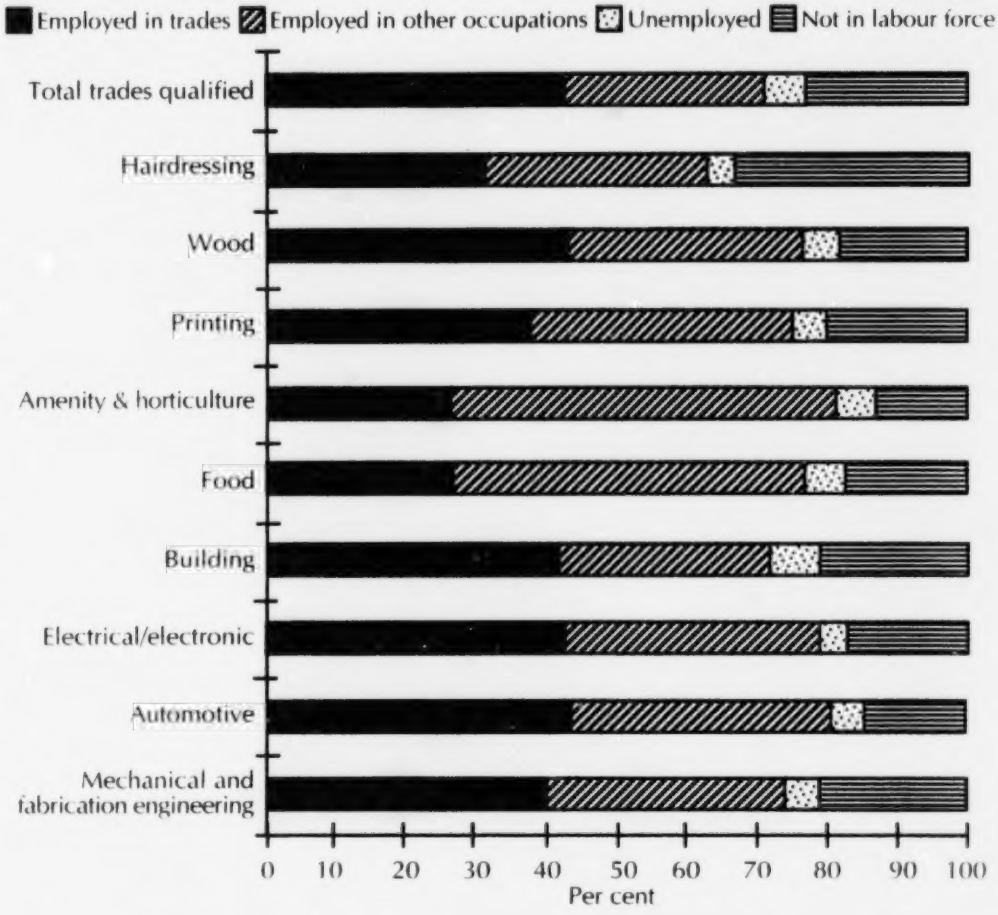
Figure 2: Trades-qualified persons aged 15 and over—proportion in trades employment, employed in other occupations, unemployed and not in the labour force, 1996



Note: 'Other occupations' includes occupations not adequately described and not stated.
Source: Derived from ABS 1996 Census of Population and Housing

As shown in table 11 and figure 3, DEWRSB's analysis demonstrates that the age profile of most of the engineering trades is broadly similar to the average for the total trades group, although the two engineering trades have somewhat distinct age profiles.

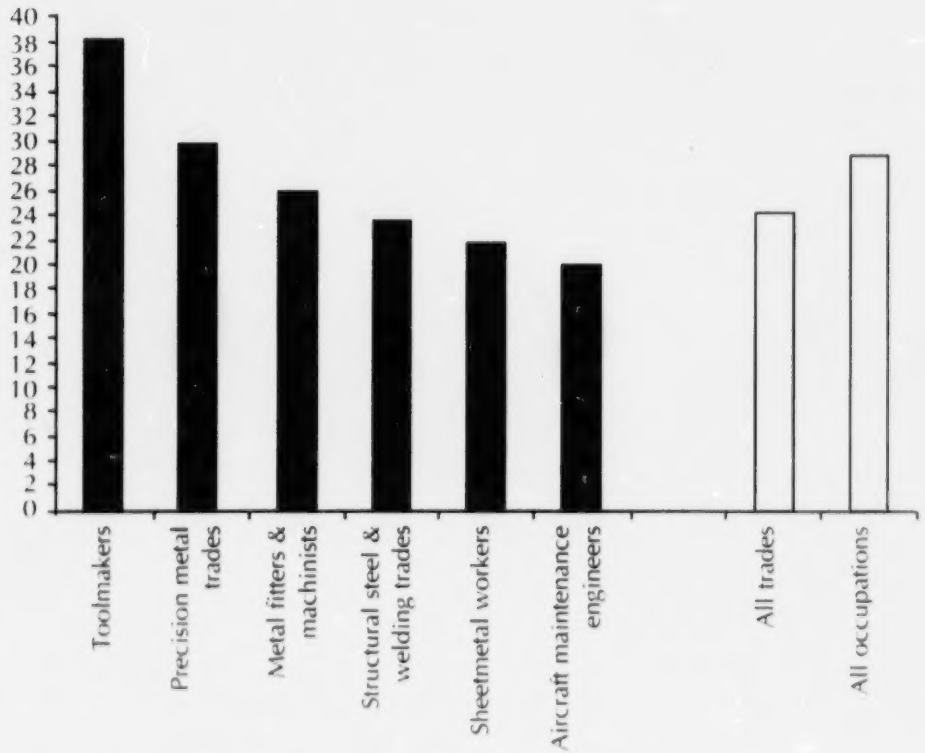
- Toolmakers have a relatively old age profile, with 38 per cent aged 45–64 years, compared with 24 per cent for all trades
- Sheetmetal workers are relatively young, with 28 per cent aged 15–24 years, compared with 23 per cent for all trades

Table 11: Age profile of engineering trades (% in age group)

Occupation	Age range		
	15–24	25–44	45–64
Toolmakers	13.9	46.1	38.3
Precision metal trades	16.6	50.7	29.8
Metal fitters and machinists	19.5	54.0	25.9
Structural steel and welding trades	21.6	54.5	23.5
Sheetmetal workers	27.8	49.1	21.7
Aircraft maintenance engineers	22.5	56.8	19.9
All trades	**23.0**	**52.1**	**24.2**
All occupations	**18.0**	**51.6**	**28.8**

Source: ABS 1996 Census of Population and Housing

Figure 3: Percentage of tradespersons aged 45–64 years



Source: ABS 1996 Census of Population and Housing

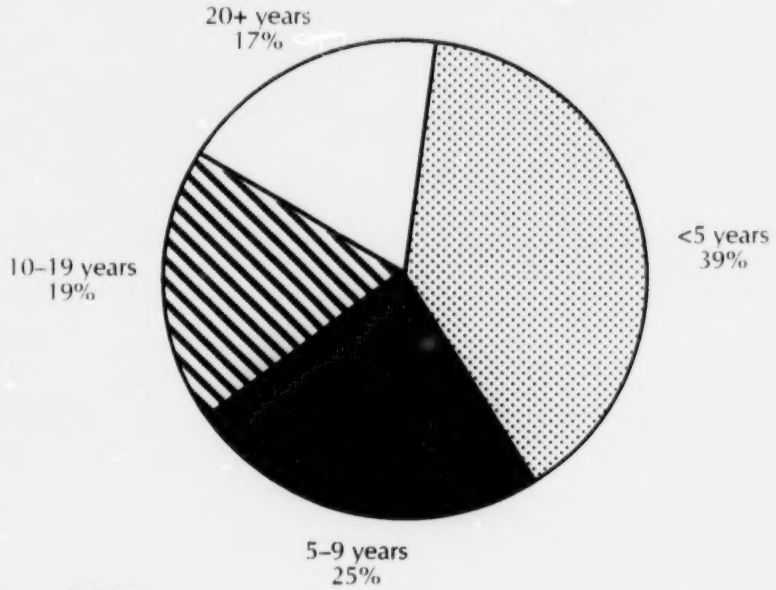
The DEWRSB analysis shows that career progression by engineering tradespersons is a significant component of wastage. Almost half of the 33 per cent of engineering tradespersons working in a non-trade occupation was employed in a more highly skilled occupation. The other half was employed in

a less skilled occupation, such as transport driver, intermediate plant operators and mining/construction workers.

The half moving to a more highly skilled occupation moved to a wide range of occupations with specialist managers and managing supervisors being key areas of employment.

DEWRSB reports that the engineering trades do not display particularly unusual patterns in relation to how long people stay working in these trades. Around two-thirds (64 per cent) of engineering tradespersons who left their trade did so within the first 10 years of employment in their trade, as shown in figure 4. Some 39 per cent of those who left worked less than five years in their trade. This pattern is similar to that for the trades group as a whole.

Figure 4: Trades-qualified persons who have left the engineering trades, by time in trade



Source: ABS 1994

The reasons why engineering tradespersons leave their trade are important in any consideration about what can be done to increase the retention of skills in the trades. DEWRSB reports that, according to the ABS publication, *Career paths of persons with trade qualification*, the main reason why engineering tradespersons left the trade was because they 'sought better pay, lack of career prospects or promoted' or because they 'wanted a change, or dissatisfied with the job'. These reasons were given by 26 per cent and 25 per cent respectively of engineering tradespersons (see table 12).

Table 12: Main reason trades qualified persons left the engineering trades

	Proportion (%)
Wanted a change, or dissatisfied with job	26.0
Sought better pay, lack of career prospects or promoted	25.0
Laid off, or lack of work	21.4
Family, personal, or ill health	10.6
More job security or sought better physical working conditions	9.5
Other	8.1
Total	**100.0**

Source: ABS 1994

The ranking pattern of reasons for leaving the engineering trades was slightly different from that for all trades. For the total trades group the main reason for leaving the trade was 'laid off, or lack of work'. This reason was given by 21 per cent of all tradespersons. A number of factors could account for those who 'wanted a change, or dissatisfied with job' including a desire for cleaner or less physically demanding work.

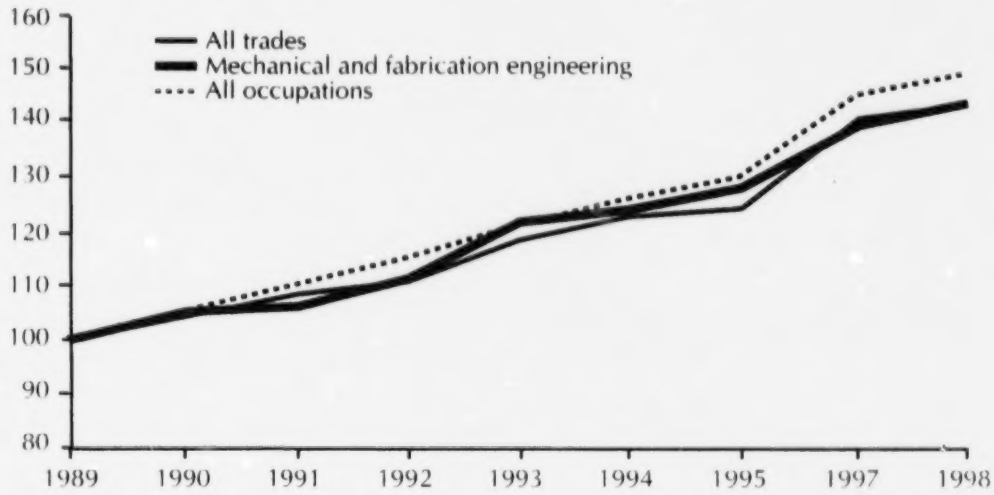
DEWRSB also reports that there is some evidence to suggest that a significant number of those who left their trade could be enticed back. The ABS survey also showed that, of those who left the engineering trades, 42 per cent would consider returning to the engineering trades. This is a lower proportion than for the trades group in total. For the trades group, 46 per cent would consider returning to their trades.

A return to the engineering trades was not, however, unconditional. The extent of ready availability of trade and alternative non-trade employment are major considerations. The other major consideration is 'better pay, promotion or improved career prospects'. This was cited by 16 per cent of potential returnees.

Despite the issues raised by people who have left the trades, it is clear that average weekly earnings for those in the engineering trades has been higher than those of the trades generally from 1992 until recently when growth has been slightly below that of the total trades group as shown in figure 5. However, earnings are lower than in the workforce generally, which may account for the importance of the pay issue in the decisions of engineering tradespersons to leave their trade.

DEWRSB also believes that wastage from the mechanical engineering trades in the next few years is likely to be a smaller problem than for other trades in the Australian economy. On the other hand, wastage from the fabrication trades is projected to be higher than the trades generally, as shown in table 13.

Figure 5: Indexed mean weekly earnings for the mechanical engineering and fabrication trades, all trades and all occupations, 1989–1998



Source: ABS 1998

Table 13: Trade wastage projections

Trade occupation*	Wastage to 2004–05
Mechanical engineering tradespersons	⇊
Fabrication engineering tradespersons	↑
Automotive tradespersons	↓
Electrotechnology tradespersons	↓
Structural construction tadespersons	↔
Final finishes construction tradespersons	↔
Plumbers	⇊
Food tradespersons	↑
Skilled agricultural workers	⇊
Horticultural tradespersons	↔
Printing tradespersons	↔
Wood tradespersons	↓
Hairdressers	⇈
Textile, clothing/related tradespersons	↔
Miscellaneous tradespersons	↓
Total tradespersons	↔

Notes: ⇈ well above average ↑ above average
↔ average
⇊ well below average ↓ below average
* Australian Standard Classification of Occupation (ASCO) 2nd ed.

Source: Wastage projections prepared by the ACER Centre for the Economics of Education and Training, Monash University under contract to DEWRSB

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The implications of the wastage of skills from the engineering trades workforce on the overall supply of skills to these trades is summarised in box 6.

Box 6: Implications of skills wastage for the engineering trades workforce

- The engineering trades have enjoyed average success compared with other trades in retaining qualified persons within the skilled trades workforce. Some 39 per cent of qualified engineering tradespersons are working in their trades, compared with only 38 per cent for other trades.
- Of those now not working in a engineering trade, the majority are working in other areas of the labour market, rather than having left the labour market or becoming unemployed.
- Half of those leaving to work in other jobs have gone onto more highly skilled/managerial positions, despite the fact that earnings in the engineering trades are better than for other trades and national average earnings.
- Forecasts are for low wastage rates in the mechanical engineering trades and higher rates in the fabrication trades in future.
- There is some potential to lower net wastage rates from these trades as 42 per cent who have left say they would consider returning with improved pay and career prospects.

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4 Employers' recent experience of skill shortages in the engineering trades

THE EVIDENCE PRESENTED to date suggests that the combination of commencements in new apprenticeship training and the now very significant set of non-apprenticeship training pathways to the engineering trades have been sufficient to keep pace with employment trends in the trades. This situation has been aided by engineering trades having:

- declining employment growth in recent years and projected low growth in the future
- slightly lower rates of wastage from the trades than other trades
- higher levels of qualified persons in the trades workforce

Nevertheless it is also clear that the preconditions for skill shortages are arising in certain trade occupations. This is particularly the case in specialised occupations such as metal fitters and machinists, toolmakers, steel welding and metal casting. The factors suggesting these preconditions for the existence of skill shortages are:

- continuing decline in the number of new apprentice commencements in the specialised trades while growth is concentrated in general engineering and mechanical engineering technicians
- forecasts of slow but rising growth in employment in engineering trades and thus rising demand for skills
- overall, a relatively low 9 per cent of the engineering workforce being made up of new apprentices in training compared to the national average of around 12 per cent
- a distinct slowdown in the growth of new apprentice completions during 1998 and the likelihood of further declines in the near future
- the severe limitations of migration as a source of skills for these trades

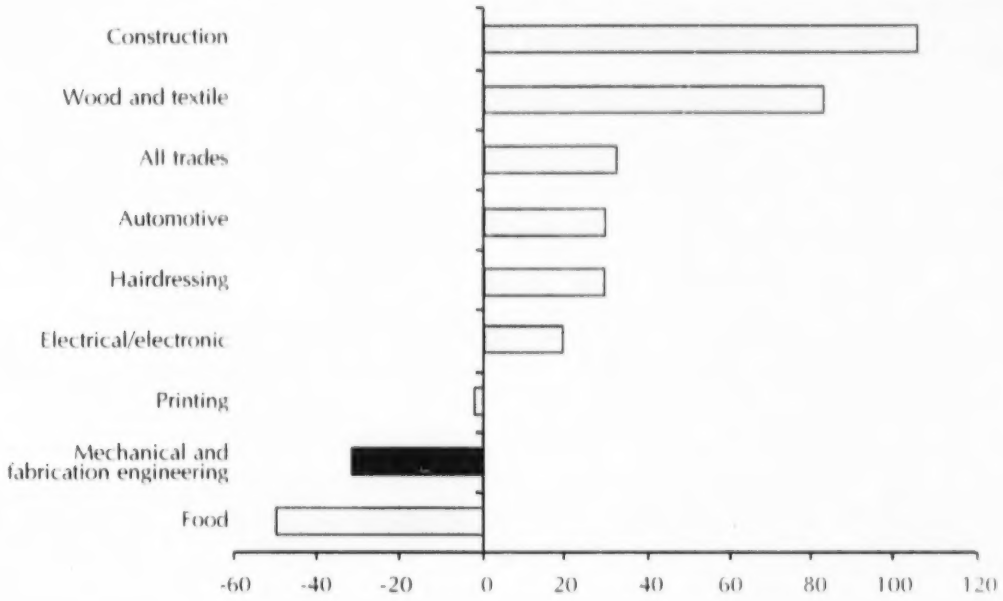
These factors have led to employers recently reporting increased skill shortages. This is discussed overleaf.

4.1 Vacancy growth

Job vacancies for engineering trades have declined in the past two years, in contrast to strong growth for almost all other trades.

DEWRSB carries out a periodic skilled vacancy survey. From the survey a fall of 31.5 per cent in vacancies for the engineering trades was recorded over the two years to October 1999, compared with the 32.8 per cent rise over the past two years recorded for all skilled trades as shown in figure 6.

Figure 6: Growth in trades groups and total trade vacancies over the two years to October 1999



Source: DEWRSB skilled vacancy survey

Information from the labour market survey of apprentices survey undertaken by DEWRSB in mid-1998 indicates that, while there are sufficient suitable applicants for engineering apprenticeships, there was considerable tightening between 1997 and 1998. The number of suitable applicants for apprenticeships in the engineering trades halved from 10.5 per apprentice recruited to 5.1.

While the same tightening was not evident from group training company apprentice recruiting the ratio of suitable applicants was quite low at 2.4 per apprentice recruited. Moreover, the youth labour market has tightened further since the survey was undertaken, and finding suitable applicants in the future could be more difficult, especially in Sydney where many alternative career opportunities are available.

4.2 Employer experiences and perspectives

DEWRSB's recent assessment (of the period September to October 1999) of skill shortages in most of the engineering trades indicates that they are currently widespread in Australia, with some evidence of these shortages broadening since September/October 1999. These shortages are evident even though the downturn in the resources sector has resulted in an easing in shortages in some States.

Table 14: Engineering trades skill shortages by State and Territory*

Tradespersons	NSW	VIC	QLD	SA	WA	TAS	NT	National
Fitter	M	S	S	R				N
Metal machinist	M	S	S	R				N
Toolmaker	S	S	S	M		S		N
Aircraft maintenance engineer		S						
Metal fabricator	M	S	S	R		S		N
Welder	M	S	S	S		S		N
Sheetmetal worker	M	S	S	S		S		N

Note: S = Statewide R = Regional ss = Seasonal N = National
* As assessed by DEWRSB

Skill shortages in the metal trades are broadening in New South Wales (particularly in Sydney and despite some oversupply of metal trades in the Hunter region) and Victoria. There are shortages of almost all metal tradespersons in Sydney, across Victoria, and in Queensland and South Australia (especially regional South Australia), and of most metal trades in Tasmania. Subdued mining activity is resulting in reduced demand and the elimination of metal trade shortages in Western Australia and the Northern Territory.

Recent work by DEWRSB shows that it has become more difficult to recruit many metal tradespersons in the eastern States. For example, in New South Wales around 80 per cent of vacancies for fitters and metal machinists were filled within four weeks in mid-1999, compared with over 90 per cent a year earlier. This reflects a tightening in the labour market, especially in Sydney where vacancies were more difficult to fill than in regional New South Wales. For toolmakers, skill shortages have worsened dramatically: only 27 per cent of employers filled vacancies within four weeks in mid-1999, down from 50 per cent a year earlier. For boilermakers/metal fabricators and welders, 64 per cent and 85 per cent of employers filled vacancies within four weeks in 1999 (only 36 per cent for boilermakers in Sydney) and for sheetmetal workers, 63 per cent of vacancies were filled, but with a much lower 45 per cent in Sydney.

In Victoria, employers commented that recruiting for metal trades was more difficult than a year earlier. For many metal trades positions only around two-

thirds of vacancies were filled within four weeks. Although there was greater success for some trades, such as metal fitter, metal fabricator and welder (75 to 90 per cent filled), employers experienced considerable difficulty in finding the desired experience and skill mix.

There is continuing strong demand for highly skilled, multi-skilled tradespersons, and particularly those with expertise in CAD/CAM, CNC, high levels of welding skills, working to very fine tolerances and in reading drawings. Many of the positions which are difficult to fill and require specialised skills include:

- sheetmetal workers: welding on electronics equipment, CNC programming, stainless steel fabrication
- fitter/metal machinists: CNC programming
- toolmakers: programming skills and high-precision tooling experience

Some employers commented that some older tradespersons did not have training and experience in the newer technologies and that many applicants were recent migrants from less-developed countries whose trade skills were below Australian and European standards. For most metal trades, employers stated that good English-speaking skills were important but that many applicants lacked these skills.

A summary of employers experiences with skill shortages in the engineering trades is given in box 7.

Box 7: Employers' experiences of engineering trades skill shortages

- The DEWRSB skilled vacancy survey shows a 31.5 per cent decline in engineering skilled vacancies over the past two years, in contrast with a 32.8 per cent rise for other trades
- DEWRSB reports that skill shortages are broadening across New South Wales, Victoria, Queensland and South Australia. There is a growing demand for high-level metals trades skills such as CAD/CAM. In many metal trades a higher proportion of employers are unable to fill their skilled vacancies within four weeks, a very different situation from the previous year
- The labour market for apprentices has tightened with the number of suitable applicants for each apprentice recruited in the engineering trades falling from 10 to 5 between 1997 and 1998
- Despite continuing decline in total employment in the engineering trades, skills shortages are likely to persist, especially for the more specialised metals trades.

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5 Conclusion

DETERMINING THE EXTENT of skill shortages is not an exact science. The evidence presented here suggests that some skill shortages are emerging in Australia's engineering trades.

In relation to new apprentice training, the evidence suggests that, while numbers commencing new apprenticeship training might need to rise to keep up with projected demand and wastage, an issue which is equally critical concerns increasing retention in new apprenticeships. Strategies for improvement need to be focussed on measures which ensure that a greater proportion of those who start a new apprenticeship finish it, rather than on measures designed to increase rapidly the numbers entering in the first place.

This report also suggests that, in the future, employers in the engineering industries increasingly will have to look further than teenagers for entrants to engineering new apprenticeships. The number of young people aged 15–24 years will stagnate in Australia over the coming decades. This means that shifting the focus from attracting new apprentice entrants from the teenage population to those aged in their early 20s will not be an adequate strategy in the future: older people will have to be considered as a major source for skills for these industries. Developing alternative pathways to the traditional apprenticeships will be critical, noting that today there are now more people undertaking training in engineering skills in the VET system in non-apprentice programs than there are in engineering apprenticeships.

The analysis in this report suggests that even more critical than increasing the numbers in training will be the issue of relevance and quality of training for existing workers, as well as new entrants, to the engineering trades. Continuous skilling of the entire skilled trades workforce and ensuring that the content and coverage of training is able to keep pace with the rapid rate of technological change in engineering is perhaps the biggest challenge of all in the quest to meet Australia's rapidly changing engineering skill needs.

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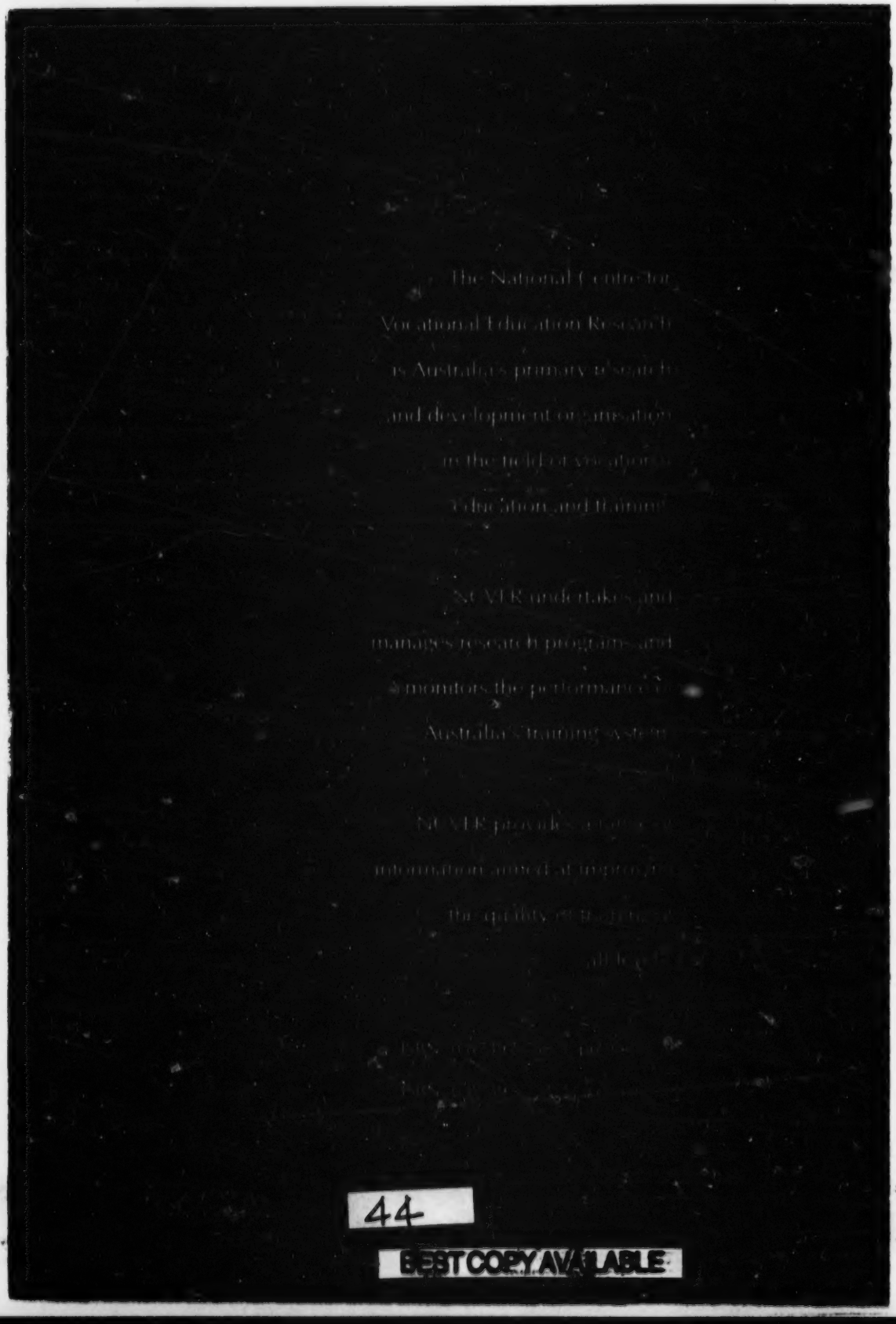
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